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and the state colleges cooperating with it quickly took steps to expand the extension work, with a view to placing in each rural county one or more agents. Within a year the number of county and home demonstration agents, club leaders and specialists in various lines employed in the great extension system was more than doubled, thus putting into effect within a year a program of expansion which under ordinary conditions would have required many years to complete.

The number of men county agents has been increased from 1,434 to 2,435 within the year, the women home demonstration agents from 537 to 1,715, and similar increases were made in the personnel of the boys' and girls' club work. To-day there are employed in this great educational system over 6,000 county and home demonstration agents, club leaders, and specialists in various lines, and the extension work is organized in substantially every agriculturally important county in the country. These agents are not only aiding the farmers in agricultural problems, but they are also rendering valuable assistance to other branches of the government, such as the Treasury Department, the Food Administration, and the Red Cross, in the prosecution of their war activities.

The efforts and achievements of the millions of farm men and women of America have been noble and remarkable. The farmers have occupied the first-line trenches of the food army. They and the agencies assisting them, the Federal Department, the state colleges, and also the state departments of agriculture, were ready when a state of war was declared and had been for years. They were charged with the responsibility for maintaining and increasing production. How they have discharged their task the results of last year's production operations and of this year eloquently testify.

DAVID F. HOUSTON,

Secretary of Agriculture

SCIENTIFIC EVENTS

TRENCH FEVER AND LICE¹

IN October, 1917, the American Red Cross Society, in conjunction with representatives

¹ From *Nature*.

of the British Expeditionary Force, formed a committee to investigate trench fever. This body has carried out much very valuable work, but its full report has not yet been made.

About the same time a War Office Committee, under the chairmanship of Major-General Sir David Bruce, was formed in England, in order to advance the knowledge of trench fever with a view to its prevention, and the research in progress at Hampstead was merged in that of the committee, of which Major Byam became a member.

Up to the close of the year the work was confined to the study of clinical evidence, the examination of the blood and urine of patients, together with the feeding of lice on them during their febrile periods, followed by the subsequent microscopical examination of the insects with a view to the discovery of the infecting organism.

With the commencement of 1918, thanks to the financial assistance of the Lister Institute and the courageous and patriotic action of a number of volunteers, it became possible to widen the scope of the research, and very valuable results speedily followed. A confirmation was obtained of McNee's main results of direct inoculation from patient to patient by blood, and the problem of transmission by the louse was seriously attacked. The committee was fortunate in having at its disposal ample stocks of lice, free from suspicion of previous infection, which had been reared under the direct supervision of Mr. Bacot, entomologist to the Lister Institute.

The first experiments in which the insect vector was concerned consisted in two of the volunteers submitting themselves to the bites of several hundred lice daily, the insects having been previously fed on patients during febrile periods both before and during the month of experiment. The lice, therefore, had many opportunities of becoming infected, and the men received the bites of these lice three times each day for thirty days. Neither showed any of the symptoms of trench fever.

Next, following the analogies of relapsing and typhus fevers, two volunteers were inoculated from lice which had fed repeatedly on trench-fever patients. In both the inoculation

was made by scratching the skin and rubbing in, eleven crushed lice in one case, and excreta voided by the lice in the other. Both men developed typical symptoms of the disease, with a relapse in six to eight days. The inoculation of louse excreta into scratches has been repeated a number of times, and in every case an attack of the disease has resulted.

It was found that the incubation in man, when infected by scarification, was remarkably constant, *i. e.*, six to eight days, and the ease and certainty with which infection could be produced pointed to the inoculation of the contents of crushed lice or louse excreta as in all probability the common, if not the invariable, method of transmission.

The excreta obtained by shaking through the gauze cover of the boxes in which the lice were confined were used in the form of a dry powder, which remained infective for at least sixteen days. In parallel experiments with the excreta of normal lice which had not been fed on trench-fever patients no symptoms of the disease were produced.

That a very small amount of blood, such as might be contained in ten lice, does not directly convey the disease through an excoriation of the skin, is indicated by the negative result obtained by rubbing 5 c.m.m. of infective blood into scratches on the skin of a volunteer.

Moreover, the following series of experiments points to the fact that the louse, after a meal of infected blood, does not void infective excreta for some days. Lice were fed on a trench-fever patient on one day only, and then on healthy men. Excreta collected on the first, third, fifth and eighth days after infection gave negative results, while those collected on the twelfth and twenty-third days proved virulent. The virus, therefore, would appear to undergo some preparation in the insect before it becomes infective. Whether this change in the louse is due to a simple multiplication on the part of the hypothetical microorganism; or to a cycle in its development, is as yet undetermined. Further, it was shown that the ingestion of louse excreta did not produce trench fever in two men who daily swallowed a dose for seven and fourteen days, respectively.

GRANITE FOR BUILDING IN 1917

THE total value of granite sold for building stone in 1917 was \$2,881,128, a decrease of \$1,083,305, or 27 per cent., compared with 1916. The rough stone sold was valued at \$590,310, which was \$312,736, or 35 per cent. less than in 1916; the dressed or manufactured stone was valued at \$2,290,818, which was \$770,569, or 25 per cent., less than in 1916. Accurate figures showing quantities are not yet available, but owing to a general increase in price the decrease in percentage of output was considerably more than in value.

The statistics given were compiled under direction of G. F. Loughlin, of the United States Geological Survey, in cooperation with the National Building Granite Quarries' Association and the State Geological Surveys of Georgia, Maryland, Minnesota, Missouri, New Jersey, New York, North Carolina, Pennsylvania, Virginia, Washington and Wisconsin.

Sales of granite for building were reported from 26 states in 1917 compared with 28 in 1916. Massachusetts, with a total value of \$646,506, and Maine, with \$525,604, ranked first and second. New Hampshire, second in rank in 1916, was third in 1917, with a value of \$337,233. Massachusetts, with \$132,700, and Maine, with \$109,941, were the only states whose sales of rough granite exceeded \$100,000 in 1917, and each of these showed a decrease of about one third compared with 1916. New Hampshire followed with \$78,484, a gain of about one quarter. Pennsylvania, which ranked first in sales of rough granite in 1916, with a value of \$224,360, was credited with only \$87,978 in 1917. The few other states that showed gains had values of less than \$15,000.

In sales of dressed granite also Massachusetts, with \$513,806, and Maine, with \$424,663, were the leading states. Maine, however, has made continuous gains in 1916 (2 per cent.) and 1917 (55 per cent.), whereas Massachusetts in the same years has suffered losses of 17 per cent. and 19 per cent., respectively. North Carolina's output, chiefly stone for mausoleum work, though classed previously as